

Building State Capacity

Evidence from Biometric Smartcards in India

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July 17, 2014

Motivation

- ▶ Anti-poverty programs in India (and many LDC's) are often implemented poorly (World Bank 2003; Pritchett 2010)
 - ▶ Estimates of “leakage” as high as 70-80% in some settings (PEO 2005; Niehaus-Sukhtankar 2013)
 - ▶ Especially relevant in the context of an expanding welfare state

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 - ▶ Patronage (Lizzeri-Persico 2001, Mathew-Moore 2011)
 - ▶ Perception that the RoI is beyond electoral cycles

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 - ▶ Patronage (Lizzeri-Persico 2001, Mathew-Moore 2011)
 - ▶ Perception that the RoI is beyond electoral cycles
- ▶ A recent theoretical literature has highlighted the importance of investing in state capacity for long-term development (Besley-Persson 2009, 2010)
- ▶ But, there is much less empirical evidence on the returns to such investments

Payments infrastructure as state capacity

- ▶ A key constraint to state capacity is the inability to securely transfer welfare payments to intended beneficiaries
- ▶ Investing in secure payments technologies (if effective) can therefore be seen as a form of “state capacity”
 - ▶ Can both improve the performance of existing programs and expand the feasible set of policy

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- ▶ Electronic benefit transfers (EBT) supported by biometric authentication have garnered huge momentum
 - ▶ Programs in over 80 LDCs (Gelb-Clark 2013)
- ▶ This is nowhere more true than in India
 - ▶ Aadhaar-enabled EBT will be “a game changer for governance.” - Finance Minister P. Chidambaram

Yet...

- ▶ A number of reasons to doubt the hype
 - ▶ Implementation and logistical challenges at scale; getting everything right difficult (Kremer 1993)
 - ▶ Subversion by vested interests whose rents are threatened (Krussel & Rios-Rull 1996; Parente & Prescott 2000)
 - ▶ Negative effects on access through dampened incentives for officials (Leff 1964)
 - ▶ Exclusion errors if legitimate beneficiaries denied payments, leaving poorest worse off (Khera 2011)
 - ▶ Cost-effectiveness unclear, based on untested assumptions (NIPFP 2012)

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 - ▶ Cost-effectiveness unclear, based on untested assumptions (NIPFP 2012)
- ▶ Little to no good evidence on effectiveness

This paper

- ▶ We worked with the state of Andhra Pradesh to randomize the rollout of biometrically authenticated EBTs (via "Smartcards") in 158 subdistricts ("mandals")
 - ▶ Rollout fully integrated with workfare (NREGS) and pension (SSP) schemes
 - ▶ Functionally equivalent precursor to Aadhaar (UID) integrated delivery of welfare programs

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- ▶ Experimenting "as is" at scale (affected population ~ 19 million) confers two unique advantages
 1. Estimates correctly reflect the myriad management challenges that accompany implementation at scale (Banerjee et al. 2008; Bold et al. 2013)
 2. We can capture both direct impacts on program performance and also indirect, spillover effects (Acemoglu 2010) that pilots cannot capture. In particular, wage effects (Imbert & Papp 2012) [Different paper]

Agenda

Context and intervention

Research design

Randomization

Implementation

Results

Program performance

Heterogeneity and mechanisms

Welfare and cost-effectiveness

Discussion

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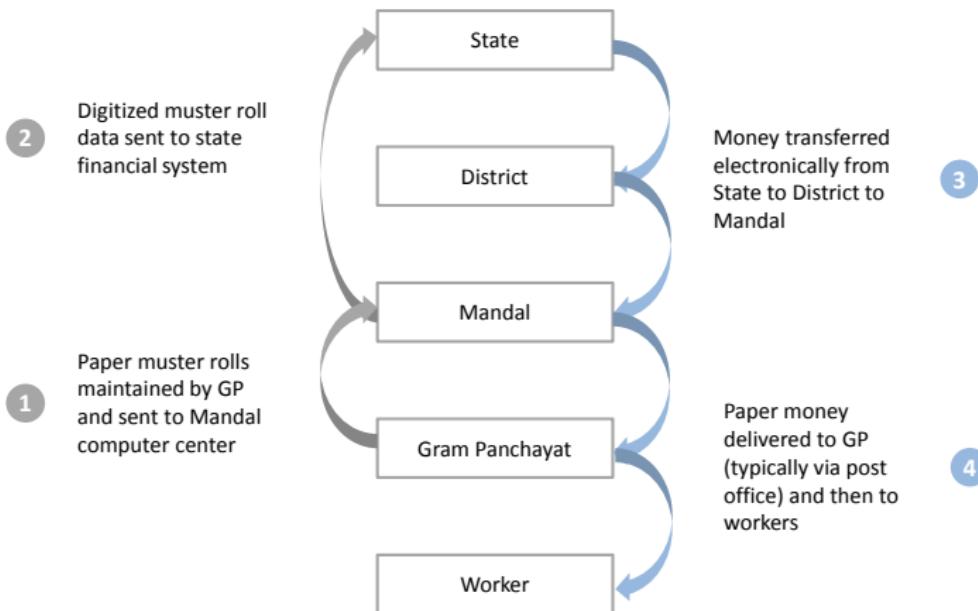
National Rural Employment Guarantee Scheme (NREGS)

- ▶ Flagship social protection program ($\sim 0.75\%$ of GDP; covers 11% of world population; AP budget \$800M)
- ▶ No eligibility restrictions: sign up for a free jobcard and be willing to work
- ▶ Paid by amount of work done at minimum wages
- ▶ Payments often late, time-consuming to collect
- ▶ High estimated leakage rates
 - ▶ Over-reporting: worker owed Rs 100, official tells government she is owed Rs 150 and keeps Rs 50 for himself
 - ▶ Ghosts: extreme form of over-reporting with non-existent workers
 - ▶ Under-payment: worker owed Rs 100, official gives her Rs 90 and keeps 10 for himself

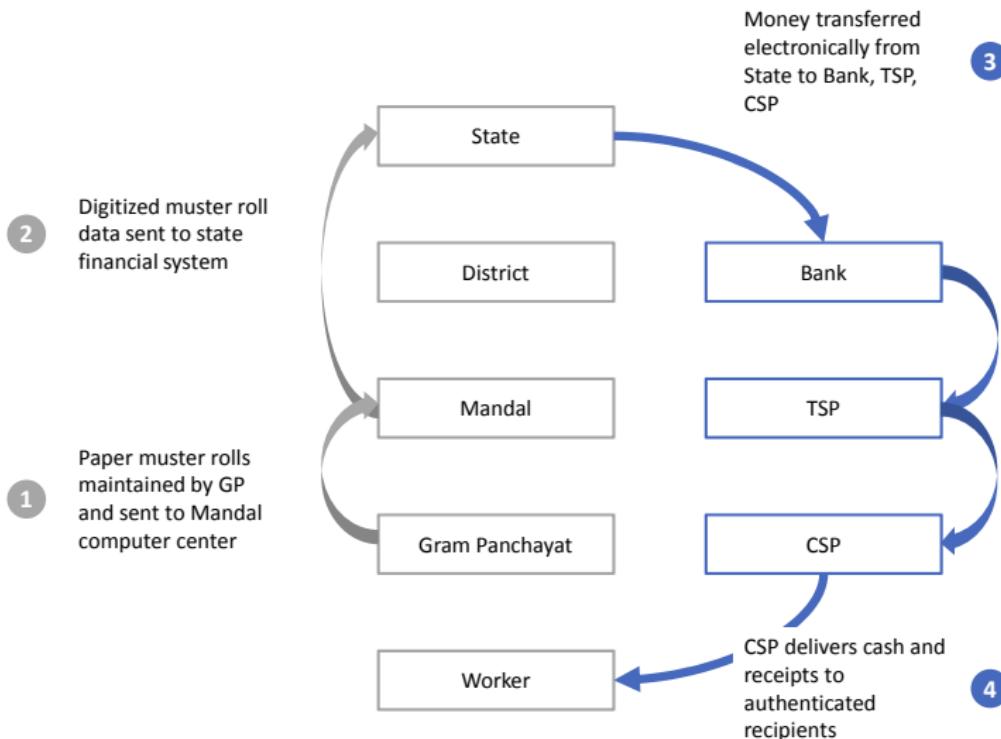
Social Security Pensions (SSP)

- ▶ Complements the NREGS by providing income support to the rural poor who cannot work (AP budget \$400M)
- ▶ Eligibility: must be poor AND either widowed, disabled, elderly, or had (selected) displaced occupation
- ▶ Rs. 200 per month (Rs. 500 for select categories)
- ▶ Modest baseline leakage rates, ghosts thought to be a problem
 - ▶ Over-reporting through miscategorization: beneficiary believes benefit is Rs 200, official claims Rs 500
 - ▶ Ghosts: non-existent or dead beneficiaries
 - ▶ Under-payment: beneficiary owed Rs 100, official gives her Rs 90 and keeps 10 for himself

Status-quo: unauthenticated payments delivered by local officials



Smartcard-enabled: authenticated payments delivered by CSP





Issued on:

01/11/2008

Date of Birth:

[REDACTED] 1938

0751 [REDACTED] 400 4664 0000 0066 CID

001 [REDACTED] 315 - ZSN

[REDACTED]
Medak AP-502278



ZERO



Smartcards could impact program performance positively or negatively

Issue under status-quo	EBTs thru CSPs	Biometric authentication
Time to collect	Could help, CSPs should be closer to home	Could help (faster lookup) or hurt (slow authentication)
Payment delays	Could help (automated process) or hurt (TSP mishandles last-mile cash management)	Could hurt (non-working devices, data syncing problems)
Overreporting	Need to collude w/ CSP	Need to collude w/ workers
Ghosts	Need to collude w/ CSP	Harder to create without live fingerprints
Underpayment	Could help, lower social distance of CSP	Shifts bargaining power to beneficiaries
Program access		Could suffer if rents are reduced

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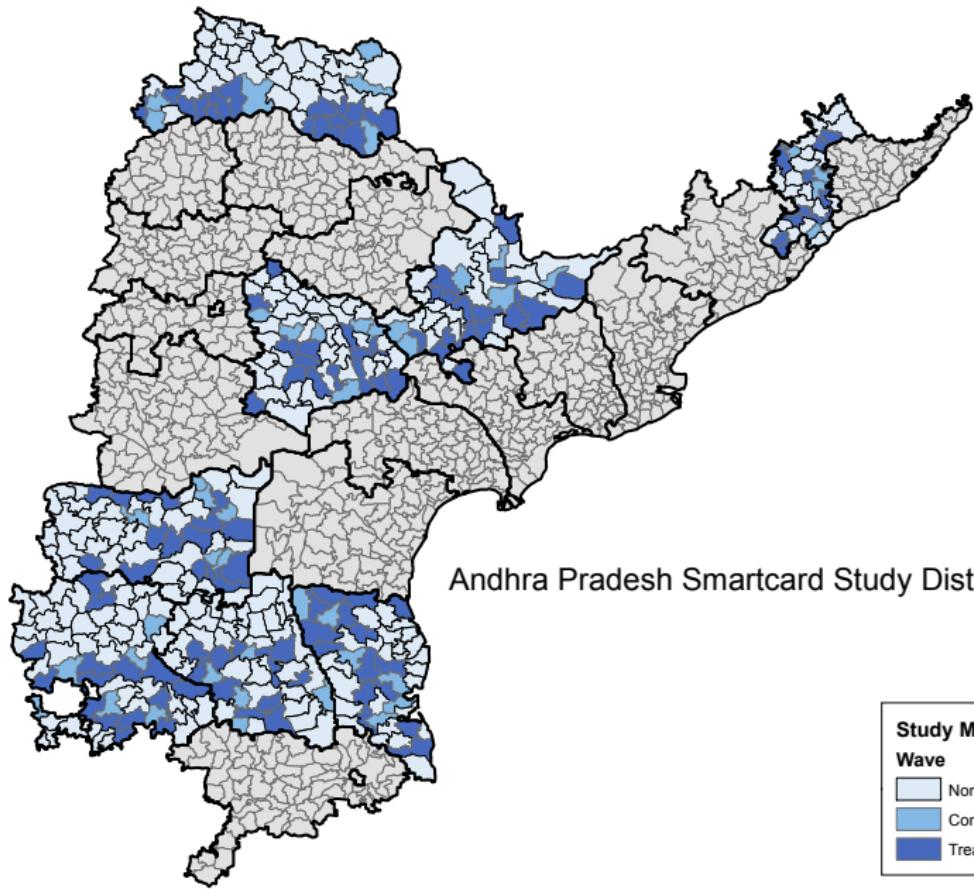
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Opportunity to evaluate mature payment system at scale

- ▶ MoU with Govt of Andhra Pradesh to randomize rollout at mandal (sub-district) level in 8 districts (2010-2012)
 - ▶ Good time for evaluation since most major implementation issues resolved in other districts (starting in 2006)
- ▶ Mandals randomized into three waves: treatment, non-study, and control ▶ Balance
 - ▶ 45 control & 113 treatment mandals
 - ▶ 24 month lag between roll out in control and treatment mandals
 - ▶ Evaluation team worked with GoAP to ensure no contamination in control areas



Sampling & data collection

- ▶ All official records (beneficiary lists, benefits paid, days worked)
- ▶ Samples representative (after re-weighting) of the following frames
 - ▶ NREGS: All jobcard holders, over-weighting recent workers
 - ▶ SSP: All beneficiaries
- ▶ Baseline (Aug-Sep 2010) and endline (Aug-Sep 2012) surveys of ~ 8800 households each
 - ▶ Seasonality
 - ▶ Attrition
 - ▶ Frame Composition
 - ▶ 886 villages (6/mandal in 6 districts, 4/mandal in 2)
 - ▶ 10 HH per village
- ▶ Survey collected data on program participation, performance, benefits; income, employment, consumption, loans, and assets; village-level economic, political, and social data

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Contextualizing implementation quality for extrapolation

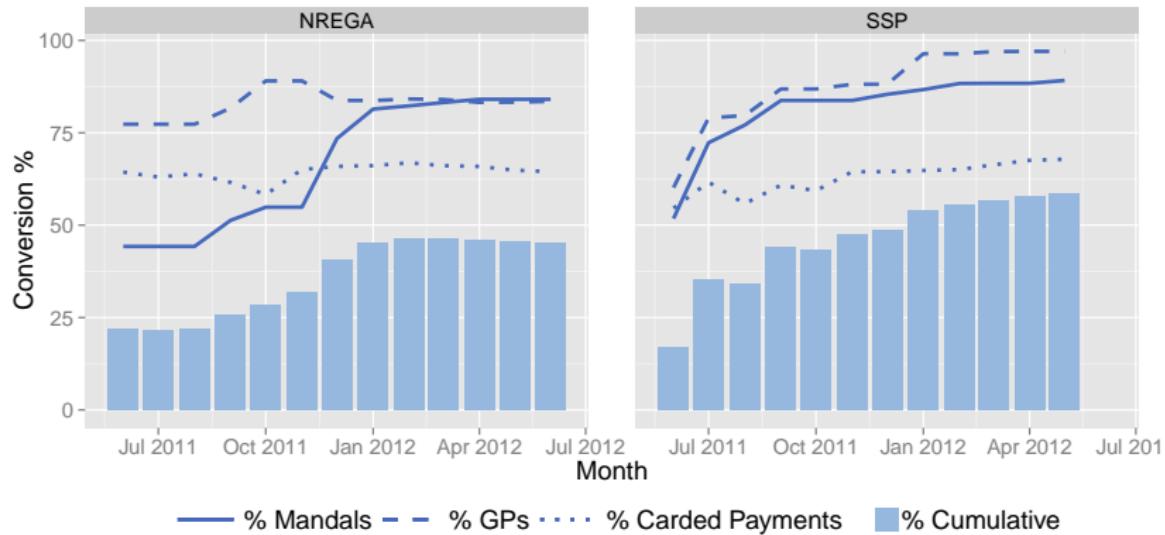
- ▶ Implementation faced various challenges
 - 1. Technical challenges, including logistics and enrollment
 - 2. Limited incentive for banks to saturate
 - 3. Pushback from vested interests in local governments
 - 4. Large political cost to state government of stopping non-carded payments

Contextualizing implementation quality for extrapolation

- ▶ Implementation faced various challenges
 1. Technical challenges, including logistics and enrollment
 2. Limited incentive for banks to saturate
 3. Pushback from vested interests in local governments
 4. Large political cost to state government of stopping non-carded payments
- ▶ Implementation benefited from experience and top-level support
 1. Most major issues solved by 2010 when evaluation began, e.g. one bank per district, re-tendering and dropping non-performing banks
 2. AP generally considered one of the better-administered states
 3. GoAP spent considerable administrative resources on implementing project

NREGA/SSP roll-out progress since Jun 2011

Wave I (Treatment) mandals



Assessing implementation

- ▶ ~ 50% implementation in two years compares favorably to large programs elsewhere
 - ▶ Social Security took the US 15 years from start of direct deposits (mid-1990s) to last check (1 March, 2013)

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- ▶ Present ITT estimates: average treatment effects corresponding to half-complete implementation over 2 years
- ▶ This is the policy parameter of interest which reflects the impact of the "intent" by the government to implement the program (and is net of all the implementation challenges)

Estimation

$$y_{i1} = \alpha + \beta T_{m(i)} + \gamma \bar{y}_{v(i)0} + \delta_{d(i)} + \epsilon_i$$

- ▶ Observations i indexed by village, household, or individual
- ▶ Default is OLS with district fixed effects $\delta_{d(i)}$
- ▶ With/without lagged village-level mean of dependent variable $\bar{y}_{v(i)0}$ (when available)
- ▶ Standard errors clustered at mandal level
- ▶ Weighted to obtain average partial effects for population of NREGS jobcard holders / SSP beneficiaries

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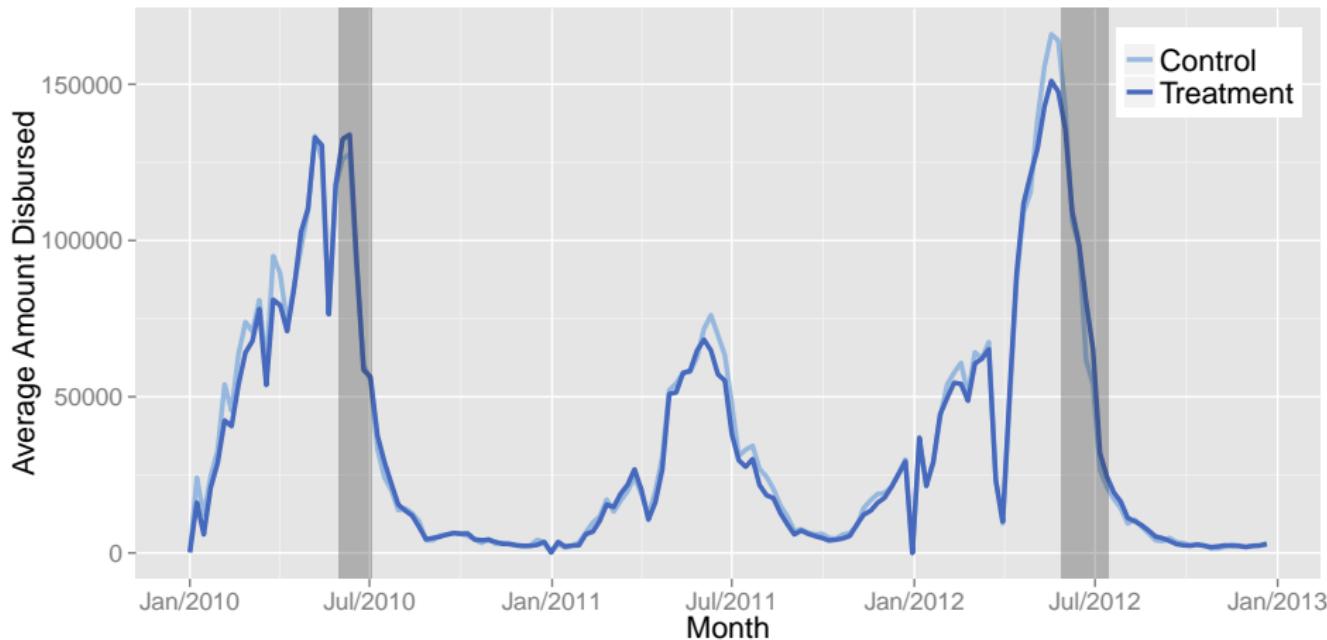
Results overview

- ▶ We find a strong and significant reduction in the time taken to collect NREGS payments ($\sim 25\%$)
- ▶ A similar reduction in delays between working and getting paid ($\sim 25\%$);
- ▶ And a reduction in the variance of the time to get paid ($\sim 15\%$)
- ▶ NREGS payments increased by 24%; leakage declined

Time to collect payments and NREGS payment delays fell

	Time to Collect (Min)				Pmt Lag (Days)			
	(1)	(2)	(3)	(4)	(5) Average	(6) Average	(7) Deviation	(8) Deviation
Treatment	-21** (9.3)	-21** (8.7)	-5.6 (5.3)	-2.8 (5.6)	-7.1* (3.8)	-10*** (3.6)	-2.9*** (1.1)	-4.7*** (1.5)
Carded GP								
BL GP Mean		.08* (.041)		.22*** (.069)		-.027 (.09)		.043 (.054)
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week Fe	No	No	No	No	Yes	Yes	Yes	Yes
Adj R-squared	.06	.08	.06	.11	.14	.31	.07	.17
Control Mean	112	112	77	77	34	34	12	12
N. of cases	10252	10181	3814	3591	14279	7254	14279	7254
Level	Indiv.	Indiv.	Indiv.	Indiv.	Indiv-Week	Indiv-Week	Indiv-Week	Indiv-Week
Survey	NREGS	NREGS	SSP	SSP	NREGS	NREGS	NREGS	NREGS

NREGS disbursements were unchanged...



Rs. per GP-week, study mandals.

...while NREGS payments increased, and leakage declined

	Official		Survey		Leakage	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	9.9 (12)	7.6 (12)	35** (15)	35** (15)	-25* (13)	-27** (13)
BL GP Mean		.12*** (.027)		.11*** (.037)		.089** (.038)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.03	.05	.05	.06	.03	.04
Control Mean	127	127	146	146	-20	-20
N. of cases	5179	5143	5179	5143	5179	5143

Dependent variable: rupees per household-week. Sample includes workers on sampled jobcards and found (or confirmed not to exist) in household surveys.

Smaller declines in SSP leakage

	Official		Survey		Leakage	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	4.4 (5.5)	5 (5.6)	13 (10)	18* (10)	-8.5 (8.3)	-13 (8.2)
BL GP Mean		.16* (.093)		.082*** (.03)		.045 (.032)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.00	.01	.01	.01	.01	.01
Control Mean	250	250	292	292	-41	-41
N. of cases	3360	3157	3360	3157	3360	3157

Dependent variable: rupees per month. Sample includes all beneficiaries in household found (or confirmed not to exist) in household surveys.

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- ▶ NREGS: households hold multiple jobcards
 - ▶ NSS data and official records imply average household holds 1.9 jobcards, conditional on holding at least one
 - ▶ Work done could be reported on jobcard not part of our sample and hence official estimates
 - ▶ Level estimates scaled by district-specific multipliers: 30.7% leakage in control, treatment effect = 10.8 percentage points (35%, $p = 0.16$) [▶ Table](#)

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- ▶ SSP: multiple beneficiaries within households
 - ▶ Difficult to match back to official data
 - ▶ Restricting to households with only one beneficiary: 7.9% leakage in control, treatment effect = 3.2 percentage points (40%, $p = 0.12$) [▶ Table](#)

NREGS channels of leakage reduction

	Ghost households (%)		Other overreporting (%)		Bribe to collect (%)	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	-.011 (.02)	-.011 (.021)	-.082** (.033)	-.083** (.036)	-.0021 (.0088)	-.0028 (.0092)
BL GP Mean		-.013 (.067)		.019 (.043)		.014 (.018)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.02	.02	.05	.04	.01	.01
Control Mean	.11	.11	.26	.26	.021	.021
N. of cases	5314	5278	3984	3703	10437	10366
Level	HHD	HHD	HHD	HHD	Indiv.	Indiv.

Other over-reporting here is indicator for jobcards with positive official payment, zero survey payment

Despite reduced corruption, access improves

	Proportion of HHDs doing NREGS work		Was any HHD member unable to get NREGS work in...		Is NREGS work available when anyone wants it		Did you have to pay anything to get this NREGS work?		Did you have to pay anything to start receiving this pension?	
	(1) Study Period	(2) Study Period	(3) May	(4) January	(5) General	(6) General	(7) NREGS	(8) NREGS	(9) SSP	(10) SSP
Treatment	.075** (.033)	.074** (.033)	-.025 (.027)	-.031 (.033)	.026* (.015)	.023 (.015)	-.00016 (.0015)	-.00038 (.0015)	-.046 (.031)	-.055 (.039)
BL GP Mean			.14*** (.037)				-.023 (.027)	-.0056** (.0027)		.025 (.045)
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.05	.06	.10	.10	.02	.02	.00	.00	.05	.05
Control Mean	.42	.42	.2	.42	.035	.035	.0022	.0022	.075	.075
N. of cases	4978	4944	4783	4531	4790	4750	7232	6908	587	354

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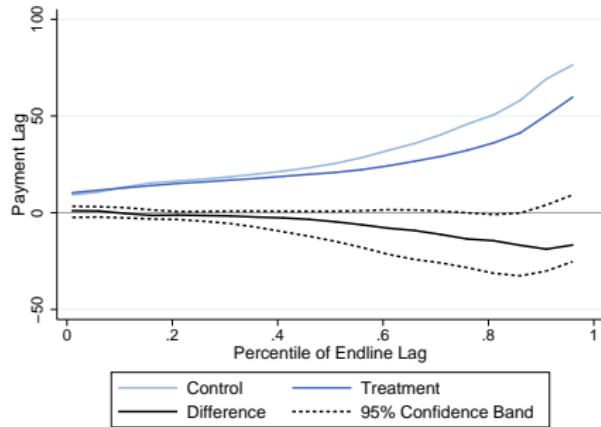
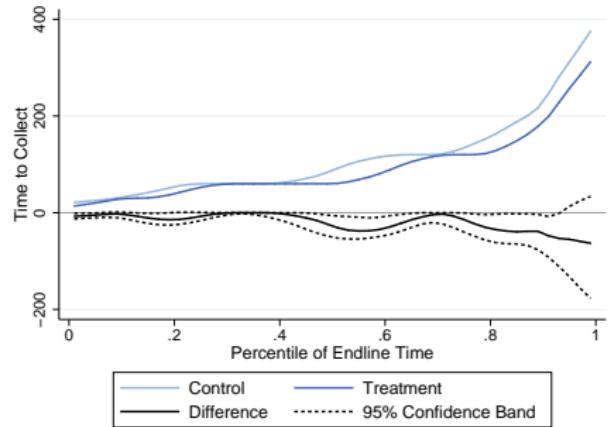
Was anybody made worse off?

- ▶ Average impacts may be misleading if poorer/ less powerful households fared differentially worse

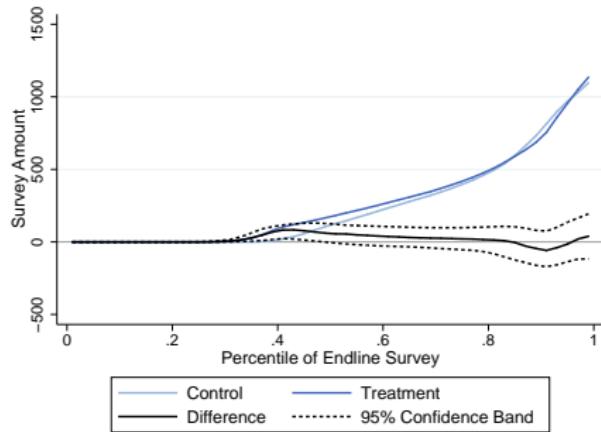
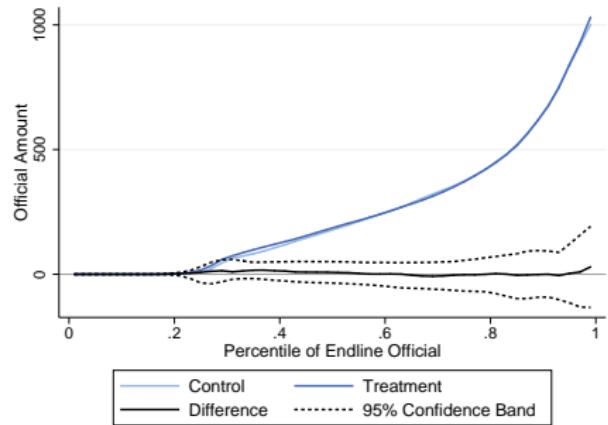
Was anybody made worse off?

- ▶ Average impacts may be misleading if poorer/ less powerful households fared differentially worse
- ▶ We test along three dimensions
 1. Distributional impacts on main outcomes (quantile TE)
 2. Heterogenous treatment effects across baseline distributions of main outcomes
 3. Non-experimental decompositions along carded/non-carded GPs/households
 - ▶ Are uncarded beneficiaries in carded GPs worse off
 - ▶ Also relevant for understanding mechanism of impact

Treated distributions stochastically dominate control



Treated distributions stochastically dominate control



No significant heterogeneity by baseline characteristics

	Time to Collect (1)	Payment Lag (2)	Official Payments (3)	Survey Payments (4)
BL GP Mean	.024 (.08)	.16 (.25)	.0049 (.042)	.047 (.074)
Consumption (Rs. 1,000)	-.087 (.16)	-.01 (.027)	-.017 (.2)	-.044 (.26)
GP Disbursement, NREGS (Rs. 1,000)	.015** (.0073)	-.00027 (.0013)	.012 (.0093)	.0065 (.016)
SC Proportion	.61 (48)	22 (14)	3.5 (49)	13 (51)
BPL Proportion	-.65 (130)	-.29 (24)	-.72 (113)	-.164 (112)
District FE	Yes	Yes	Yes	Yes
Week FE	No	Yes	No	No
Control Mean	112	34	127	146
Level	Indiv.	Indiv-Week	HHD	HHD
N. of cases	10204	12390	5030	5030

Non-experimental decompositions of main effects

	Time to collect		Official		Survey		Leakage		Payment lag	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Carded GP	-33*** (8.2)		8 (13)		39** (15)		-31** (13)		-6.7** (3.2)	
Have SCard, Carded GP		-33*** (8.5)		70*** (16)		136*** (23)		-66*** (22)		-4 (2.5)
No SCard, Carded GP		-32*** (8.6)		-40*** (14)		-28 (18)		-15 (16)		-3.1 (2.3)
Not Carded GP	5 (13)	4.9 (13)	7.4 (16)	19 (21)	22 (22)	46 (28)	-15 (19)	-26 (24)	-7.9 (5.4)	-6.7 (5.2)
BL GP Mean	.071* (.039)	.071* (.039)	.28*** (.066)	.2** (.085)	.25*** (.088)	.1 (.1)	.22*** (.078)	.28*** (.094)		
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week Fe	No	No	No	No	No	No	No	No	Yes	Yes
Adj R-squared	.10	.10	.04	.06	.06	.10	.04	.05	.14	.13
Control Mean	112	112	127	127	146	146	-20	-20	34	34
N. of cases	10181	10147	5143	4714	5143	4714	5143	4714	14279	14256
Level	Indiv.	Indiv.	HHD	HHD	HHD	HHD	HHD	HHD	Indiv-Week	Indiv-Week

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Users strongly prefer Smartcards to the status quo

	NREGS			N	SSP			N
	Agree	Disagree	Neutral/ Don't know		Agree	Disagree	Neutral/ Don't know	
Positives:								
Smartcards increase speed of payments (less wait times)	.80	.04	.16	4227	.85	.06	.09	1964
With a Smartcard, I make fewer trips to receive my payments	.70	.04	.25	4219	.76	.05	.19	1963
I have a better chance of getting the money I am owed by using a Smartcard	.76	.02	.22	4218	.81	.03	.16	1963
Because I use a Smartcard, no one can collect a payment on my behalf	.75	.04	.21	4216	.78	.04	.17	1959
Negatives:								
It was difficult to enroll to obtain a Smartcard	.19	.63	.17	4228	.31	.57	.12	1965
I'm afraid of losing my Smartcard and being denied payment	.56	.15	.29	4071	.66	.14	.21	1893
When I go to collect a payment, I am afraid that the payment reader will not work	.52	.16	.32	4072	.62	.17	.21	1892
I would trust the Smartcard system enough to deposit money in my Smartcard account	.26	.36	.38	4219	.27	.42	.31	1961
Overall:								
Do you prefer the smartcards over the old system of payments?	.87	.05	.08	4352	.92	.04	.04	1989

Sample includes beneficiaries who had received a Smartcard and used it to pick up wages, or had enrolled for, but not received, a physical Smartcard (65% of NREGS beneficiaries who worked in sampled period, 75% of SSP beneficiaries).

Quantifying welfare impacts

Real cost of administration: 2% of (converted) payments, gross of savings on status-quo

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Efficiency effects

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Efficiency effects

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- ▶ (Reduced variability of payment lags)

Redistributive effects: *directionally* positive but can only be quantified by taking a stand on welfare weights

- ▶ Shorter payment lags moves float: from banks to beneficiaries
- ▶ Reduced NREGS leakage: from corrupt officials to beneficiaries/government
- ▶ Reduced SSP leakage: from corrupt officials/illegitimate beneficiaries to beneficiaries/government

Smartcards are cost-effective

Concept	Metric	NREGS	SSP	Total
Costs	2% of payments in converted GPs	\$4.05	\$2.25	\$6.30
Efficiency gains	Time savings	\$4.31	-	\$4.31
	Predictability	?	-	?
Redistribution	Float	\$0.40	-	\$0.40
	Leakage	\$32.78	\$3.61	\$36.38

All figures in \$ million per year, for 8 study districts

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Summary and Lessons Learned

- ▶ Smartcards appear cost-effective under real-world conditions
 - ▶ Implementation was incomplete, but Smartcards still improved the ease, speed, predictability, and volume of payments
 - ▶ Improvements spread across distribution, and practically everyone prefers Smartcards over status quo
 - ▶ Time savings alone justify costs in the case of NREGS; large reductions in leakage; no negative extensive margin effects

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- ▶ Our data do not capture potential future gains from services built on Smartcards infrastructure
 - ▶ Public sector programs (e.g. food security alternatives)
 - ▶ Private sector products (e.g. savings products, remittances)
- ▶ Investments in state capacity in LDC's may have large returns relatively quickly (even with incomplete implementation)

Further Discussion Topics

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 - ▶ Why did exclusion errors not take place?
 - ▶ Why did access go up even though leakage went down?
 - ▶ Why did vested interests not scuttle the program?
- ▶ Implications for Aadhar-linked benefit transfers
 - ▶ May be prudent to make it convenient but not mandatory
 - ▶ Essential to enable continuous low-cost enrollment
 - ▶ Needs dedicated implementation teams in each state
 - ▶ Other implementation lessons in our companion report

Agenda

Context and intervention

Research design

Randomization

Implementation

Results

Program performance

Heterogeneity and mechanisms

Welfare and cost-effectiveness

Discussion

NREGS attrition

- ▶ Some jobcards drop out of baseline sample frame because of death, migration, or household splits (1.58% overall)
- ▶ New jobcards also enter because of creation of new nuclear families, migration, and new enrollments (6.77% over 2 years)
- ▶ Neither change differentially affects treatment mandates

	(1) Attritors from Baseline	(2) Entrants in Endline
Control	.024	.059
Treatment	.013	.061
p-value	.22	.79

SSP attrition

- ▶ Some recipients drop out of baseline sample frame because of death or migration
- ▶ New recipients also enter mainly because of creation of new enrollments
- ▶ Neither change differentially affects treatment mandates

	(1) Attritors from Baseline	(2) Entrants in Endline
Control	.097	.16
Treatment	.097	.17
p-value	.95	.36

▶ Back

NREGS frame composition

	(1) N. of Members	(2) Hindu	(3) SC	(4) Any HHD Mem Reads	(5) BPL	(6) Total Consump	(7) Total Income	(8) Own Land
Treatment	.045 (.11)	-.026 (.018)	.023 (.022)	-.031 (.027)	-.0017 (.022)	395 (4676)	7010* (3772)	.06** (.024)
El Entrants	-.16 (.25)	.011 (.047)	.029 (.077)	.064 (.049)	.067 (.043)	-10734 (6852)	-3259 (10397)	-.054 (.12)
Treat*El Entrants	.14 (.34)	-.029 (.058)	-.077 (.089)	-.089 (.071)	-.05 (.058)	4506 (9068)	17303 (14190)	.06 (.14)
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.02	.07	.02	.01	.01	.01	.04	.01
Control Mean	4.3	.93	.19	.85	.89	90317	69708	.59
N. of cases	4944	4944	4944	4904	4922	4937	4910	4920
Level	HHD	HHD	HHD	HHD	HHD	HHD	HHD	HHD

SSP frame composition

	(1) N. of Members	(2) Hindu	(3) SC	(4) Any HHD Mem Reads	(5) BPL	(6) Total Consump	(7) Total Income	(8) Own Land
Treatment	-.016 (.12)	.019 (.021)	-.025 (.021)	-.048* (.027)	.0014 (.018)	-1600 (3999)	4436 (4002)	.0046 (.032)
EI Entrants	-.034 (.27)	.0076 (.042)	-.079** (.034)	-.017 (.044)	.078*** (.026)	-1575 (4029)	-1419 (4577)	.099* (.056)
Treat*EI Entrants	-.079 (.3)	-.001 (.046)	.049 (.04)	.067 (.054)	-.053 (.033)	7474 (5553)	5918 (5668)	-.053 (.067)
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.05	.04	.02	.02	.01	.02	.07	.02
Control Mean	3.5	.89	.21	.64	.87	63792	52763	.52
N. of cases	3176	3176	3176	3136	3155	3174	3161	3166
Level	HHD	HHD	HHD	HHD	HHD	HHD	HHD	HHD

▶ Back

Balance on mandal characteristics

	Treatment	Control	Difference	p-value
Population	43734	43578	155	.94
Pensions per capita	.12	.12	.0013	.79
Jobcards per capita	.55	.55	-.0063	.84
Literacy rate	.45	.45	.0039	.74
% SC	.19	.19	.003	.81
% ST	.1	.12	-.016	.53
% population working	.53	.52	.0047	.63
% male	.51	.51	.00018	.88
% old age pensions	.48	.49	-.0095	.83
% weaver pensions	.009	.011	-.0015	.71
% disabled pensions	.1	.1	.0021	.83
% widow pensions	.21	.2	.014	.48

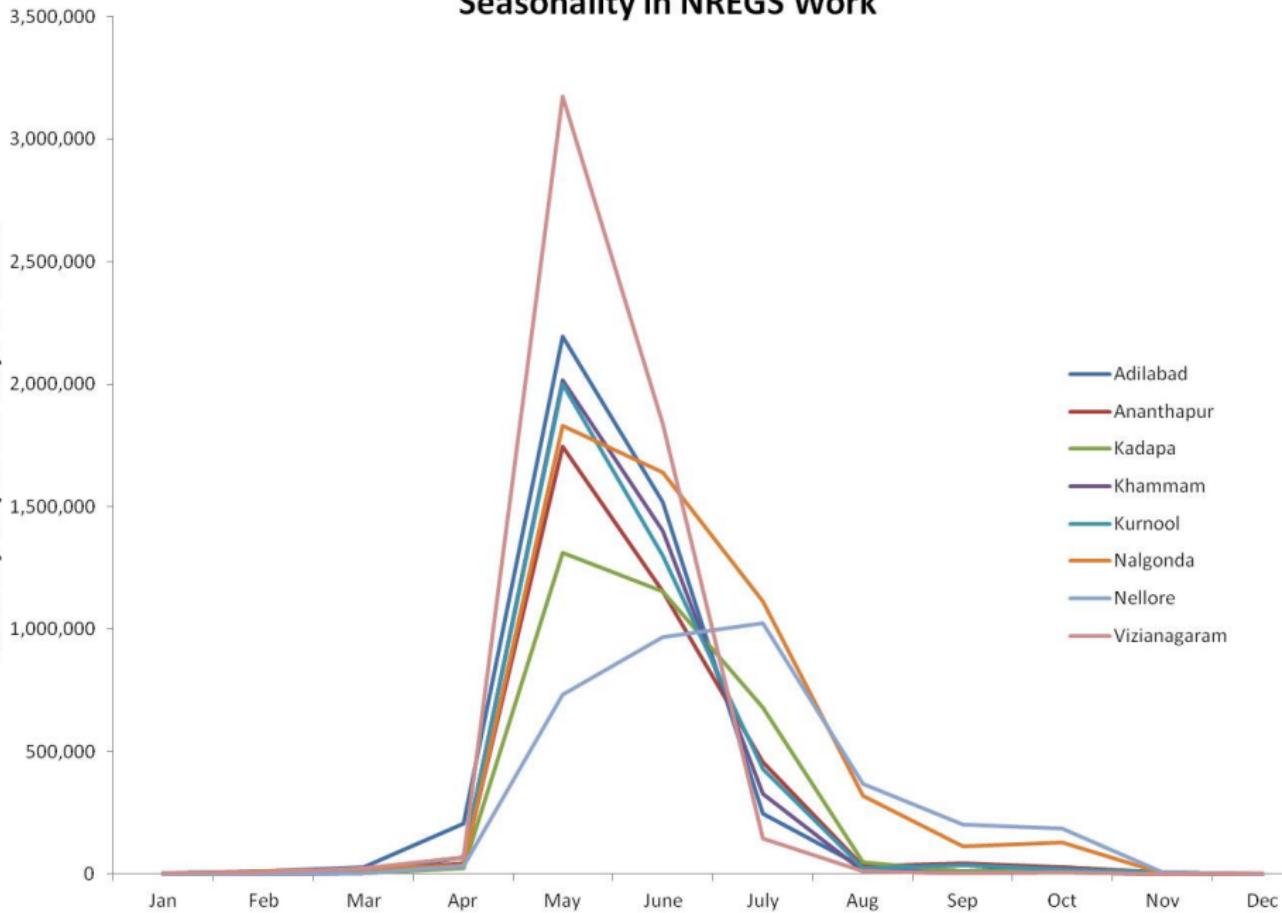
Balance on household characteristics

	NREGS				SSP			
	Treatment	Control	Difference	p-value	Treatment	Control	Difference	p-value
HHD members	4.8	4.8	.02	.9	4.1	4.2	-.15	.4
BPL	.98	.98	.0042	.73	.98	.97	.0039	.65
Scheduled caste	.22	.25	-.027	.34	.19	.23	-.036*	.092
Scheduled tribe	.12	.11	.0061	.83	.096	.12	-.023	.45
Literacy	.42	.42	.0015	.93	.38	.39	-.013	.4
Annual income	41447	42791	-1387	.49	33554	35279	-2186	.31
Annual consumption	104607	95281	8543	.4	74602	77148	-3445	.55
Pay to work/enroll	.01	.0095	.0009	.83	.054	.07	-.016	.24
Pay to collect	.058	.036	.023	.14	.059	.072	-.008	.81
Ghost HHD	.031	.017	.014	.12	.012	.0096	.0018	.76
Time to collect	157	169	-7.3	.63	94	112	-18**	.027
Average Payment Delay	29	23	.22	.93				
Payment delay deviation	11	8.8	-.42	.77				
Official amount	167	159	12	.51				
Survey amount	171	185	-12	.56				
Leakage	-4.4	-26	25	.15				
NREGS availability	.47	.56	-.1**	.02				
HHD doing NREGS work	.41	.41	.0021	.95				

▶ Back

Seasonality in NREGS Work

Officially Reported Days Worked



NREGS payments increased, and leakage declined

Dependent variable: Rupees per week (averaged over jobcard frame)

	Official		Survey		Leakage	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	9.7 (25)	2.6 (24)	33 (21)	32 (20)	-23 (21)	-28 (20)
BL GP Mean		.16*** (.025)		.1*** (.037)		.13*** (.033)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.03	.05	.06	.07	.06	.07
Control Mean	260	260	180	180	80	80
N. of cases	5179	5143	5179	5143	5179	5143

Includes all residents of households of sampled jobcards. Official figures scaled by # jobcards per households estimated using NSS data. p-value on leakage treatment effect = 0.16

SSP payments increased, and leakage declined

Dependent variable: Rupees per month

	Official		Survey		Leakage	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	9.7 (25)	2.6 (24)	33 (21)	32 (20)	-23 (21)	-28 (20)
BL GP Mean		.16*** (.025)		.1*** (.037)		.13*** (.033)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.03	.05	.06	.07	.06	.07
Control Mean	260	260	180	180	80	80
N. of cases	5179	5143	5179	5143	5179	5143

Includes only households with single beneficiaries. p-value on leakage treatment effect = 0.12

Treatment affected participation symmetrically across measurements

	WSM		Survey		Official		Muster - WSM		Survey - WSM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Treatment	12 (12)	10 (10)	69 (49)	44 (36)	26 (27)	17 (20)	14 (20)	6.8 (17)	57 (44)	34 (35)
District FE	Yes	Yes	Yes	Yes						
Week Fe	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Adj R-squared	.09	.13	.03	.09	.07	.16	.09	.14	.02	.07
Control Mean	28	28	173	173	108	108	81	81	145	145
N. of cases	513	513	513	513	513	513	513	513	513	513

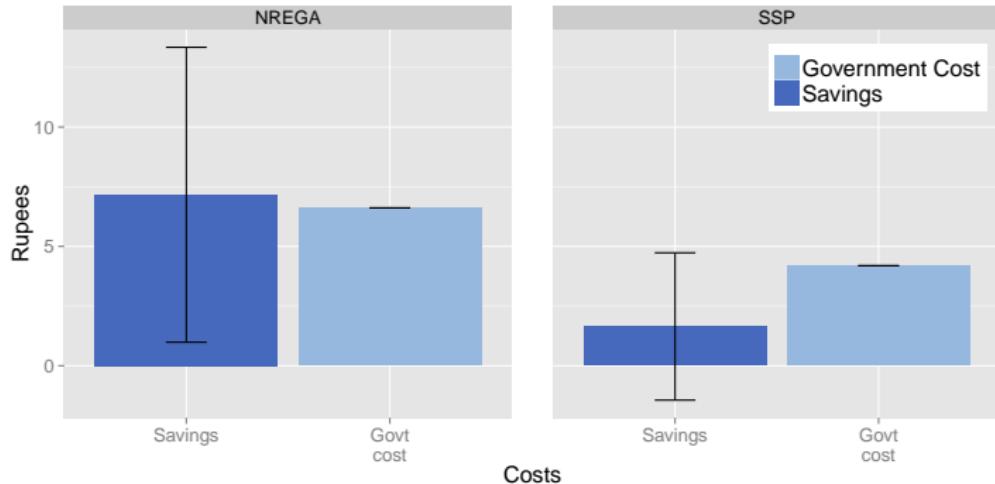
Measurement did not affect outcomes

	WSM	Official			Survey	
	(1)	(2)	(3)	(4)	(5)	(6)
HHD Survey in GP	-3.4 (8)	10 (34)	-4.8 (33)			
WSM in GP		7.5 (31)	-13 (28)	3 (42)	-17 (37)	113 (106)
WSM Survey in Week		-52 (51)	-71 (52)	-31 (39)	-39 (39)	34 (84)
Recon Survey in Week		12 (69)	-.8 (68)	45 (52)	40 (51)	45 (89)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Week Fe	Yes	Yes	Yes	Yes	Yes	Yes
BL GP Value	No	No	Yes	No	Yes	Yes
GP Size FE	No	Yes	Yes	No	No	No
Adj R-squared	.17					
Control Mean	48	758	758	755	755	1170
Level	Week	Week	Week	Week	Week	Week
Sample	WSM	All	All	HHD & WSM	HHD & WSM	HHD
N. of cases	682	52311	52311	7728	7728	6153

NREGS employment in June

	Days worked		Hours worked		Hourly wage	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	.92 (.66)	.84 (.64)	5.5 (3.4)	5 (3.3)	.38 (.77)	.52 (.8)
BL GP Mean		.14*** (.042)		.14*** (.041)		.022 (.037)
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj R-squared	.09	.10	.11	.11	.03	.03
Control Mean	8.2	8.2	42	42	17	17
N. of cases	10567	10494	10567	10494	6960	6605
Survey	NREGS	NREGS	NREGS	NREGS	NREGS	NREGS

Monetizing time savings alone covers costs for NREGS payments



Assumptions

- ▶ No cost to govt of status quo system (conservative)
- ▶ Government pays only in carded GPs (actual)
- ▶ Reported wages in June (conservative)
- ▶ One trip per payment (consistent with low balances)

Why biometrics improve upon regular IDs

